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Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

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26 March 1986

**WORLDWIDE REPORT
NUCLEAR DEVELOPMENT AND PROLIFERATION**

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HONG KONG

DAYA N-PLANT MAY ENDANGER HONG KONG ENVIRONMENT

Hong Kong HONGKONG STANDARD in English 29 Jan 86 p 2

[Text] THE safety of nuclear plants like China's proposed Daya Bay power station, to be built near Hongkong, was questioned yesterday by a representative of Friends of the Earth, a conservation organisation.

Ms Linda Siddall claimed that misleading data had been supplied by the nuclear industry as to the safety conditions of power plants.

Speaking at a meeting of the Peninsula Rotary Club, she urged Hongkong residents to demand that their questions about the plant be answered by those planning to build it.

Daya Bay, which will provide 70 percent of Hongkong's energy needs, is a joint venture between China and France with Britain supplying the turbine equipment. Construction is scheduled to start soon and the plant should be operating within six years.

It is located in Shenzhen, just north of the New Territories.

Ms Siddall said that while recent films and television programmes have focussed on the risks to human health posed by major nuclear accidents, there are also major risks posed by the normal functioning of a plant like the one at Daya Bay.

The nuclear industry makes three points in arguing that exposure to such radiation levels is not

a health hazard, she said. One argument is that the dose receivable from a power plant is less than that from background radiation and therefore negligible.

Secondly, it is often reported that emissions are kept within safe limits set by the International Commission for Radiobiological Protection (ICRP).

Finally, the industry has stated that there is no proof that people living near reactors have increased cancer rates.

Taking each argument in turn, she said that while radioactivity occurs naturally, it does not mean that it is harmless.

"It is estimated that natural radiation is responsible for about 19,000 cancer and leukemia deaths per year in the US and at least 58,000 deaths from other disease," she said.

"Thus the argument that radiation from a reactor is negligible because it is less than background radiation is not particularly comforting," she said. "Particularly when it is remembered that such radiation is on top of the background radiation."

Ms Siddall questioned the quality of the assessments by the ICRP claiming that the make-up of the commission "which purports to be independent is a self-perpetuating organisation of scientists closely connected with the nuclear industry."

/12851

CSO: 5150/0071

PEOPLE'S REPUBLIC OF CHINA

STATUS OF CHINA'S NUCLEAR S&T RECAPPED

Harbin HEILONGJIANG RIBAO in Chinese 31 Oct 85 p 1

[Article by Zhuo Peirong [0587 1014 2837]]

[Text] Beijing, 30 Oct (XINHUA)--China's nuclear industry has experienced continuous growth since 1955, and its achievements have attracted world attention. A few days ago an official of the Ministry of Nuclear Industry gave a presentation to the reporters outlining the major accomplishments of China's nuclear industry during the past three decades.

--Acquisition of the technologies to develop atomic bombs, hydrogen bombs, and power plants used in nuclear submarines. China has armed its military units with nuclear weapons; the development of nuclear weapons has enhanced China's defensive strength and has been a major factor in protecting the security of this country and maintaining world peace.

--Establishment of a firm foundation in nuclear technology and a comprehensive, nuclear industrial system. This system includes organizations devoted to uranium exploration, mining and processing as well as recycling of nuclear fuel, manufacturing of nuclear weapons, and the peaceful use of nuclear energy and nuclear technology. The development of nuclear science has created many new scientific disciplines, new technologies and new industries such as nuclear medicine, nuclear agriculture and new industries such as nuclear medicine, nuclear agriculture, nuclear environmental protection, nuclear analysis and measurement techniques, nuclear display and tracking techniques, nuclear automatic control technology, nuclear radiation processing industry, and nuclear electronic instrument manufacturing industry; a number of these technologies have already been successfully implemented in various applications.

--Development of China's uranium resources and establishment of technical service facilities for uranium products and other related products. China has already accumulated a sizable reserve of atomic fuel for nuclear power plants and a reserve of uranium products. The instrument manufacturing capability, engineering design capability and construction/installation capability of the nuclear industry have been extensively used in non-nuclear applications.

--Establishment of a firm foundation in nuclear power generation. Currently China has 10 nuclear reactors of various types, and has accumulated

considerable operational experience. The Chinshan nuclear power plant project in Zhejiang Province is making good progress, and efforts have been initiated in the theoretical resource of nuclear power plants for heat generation.

--Training a team of highly qualified technical personnel for the nuclear industry.

This official said that China's nuclear industry is following the current trend both in this country and abroad to redirect its energy for economic construction. In recent years, the demands of China's economic and social development have supplied constant challenges to the nuclear industry.

With increasing public awareness about nuclear technology, it will undoubtedly play an increasing role in the lives of the Chinese people.

3012/9274
CSO: 4008/39

CANADA

POTENTIAL U.S. NUCLEAR DUMP SITES AROUSE CONCERN

External Affairs Study Group

Toronto THE TORONTO STAR in English 13 Feb 86 pp A1, A4

[Article by Alan Story: "US Plan for Nuclear Dump Near Border Alarms Ottawa"]

[Text] HALIFAX — The United States has selected several sites close to the Canadian border as possible locations for a major nuclear waste storage dump.

One site is in Maine across from New Brunswick, two are in Minnesota across from Manitoba and one in Wisconsin near the Great Lakes.

The selection of the sites — ignoring assurances Ottawa had thought it had obtained from Washington — has raised serious concerns that will be discussed at a special meeting of federal and provincial officials in Ottawa tomorrow.

Canada has already requested the issue be placed on the agenda of External Affairs Minister Joe Clark's next meeting with U.S. Secretary of State George Shultz. A date and place for the meeting has not been decided.

And yesterday Maine Governor Joseph Brennan urged "Canada and Canadians to speak out loudly and quickly on this frightening and terrifying idea of a nuclear dump right on your border."

Highly radioactive wastes have been held in temporary storage areas across the United States since 1945. One estimate suggests that there are 12,000 tons of spent nuclear fuel being held in temporary storage pools in the U.S.

Deposits of some nuclear materials to be stored underground, such as plutonium-239, will remain a hazard to human health for 100,000 years. Current technology has created canisters that last only 700 years.

Canadian concern has been building since mid-January when the U.S. energy department released its short list of 12 primary and 8 backup sites for the eastern U.S.

The four sites closest to Canada or to boundary waters — in Maine, Minnesota and Wisconsin — are all on the primary list.

Of the 20 sites on the complete short list, 14 are in states bordering Canada.

The nuclear waste dump program is a massive undertaking:

- Detailed field work on the 12 primary sites will last from 1987 to 1991;
- 3 sites then will be recommended and construction, costing between \$800 million and \$1 billion, will start on test shafts at each site;
- In the mid-1990s, the U.S. president is scheduled to choose one eastern site, expected to start operation in 2006 to 2008;
- A high-level nuclear dump site for the western U.S. is scheduled to be announced in April. Locations in Texas, Nevada and Washington

are on the final list. Most speculation suggests Washington, which borders on British Columbia, will be chosen.

Officials at External Affairs say the issue is so potentially divisive it could create as much tension as the U.S.-Canada dispute over acid rain.

Meeting planned

"If it looks as if those sites are selected and the U.S. ignores obvious signs of danger, this could become as big an issue as acid rain or Arctic sovereignty," said Stan Gooch, chairman of a group from the external affairs department that is studying the issue, told The Toronto Star yesterday.

In the meantime, Gooch will meet tomorrow in Ottawa with government representatives from New Brunswick, Ontario and Manitoba, the provinces that would be most affected by the U.S. plan.

Gooch said that "the primary sites now on the short list still obviously concern us."

Ontario has yet to take a position on the issue, said John Carson of the province's ministry of inter-governmental affairs.

"We want to understand the full inter-governmental position," he said.

An external affairs spokesman said tomorrow's meeting is designed to firm up the department's strategy in preparation for the Shultz-Clark meeting.

Manitoba Premier Howard Pawley has already strongly protested the proposed Minnesota sites.

"We don't see why Manitoba, a non-nuclear province, should be asked to bear the risk," an official in the Manitoba environment department said in an interview.

The Minnesota sites — one less than 80 kilometres (50 miles) from Canada — are within the drainage basin of the Red River, which flows north into Manitoba.

In New Brunswick, Janice Harvey, the executive-director of the province's conservation council, said burying the waste is "a cheap and crude solution."

She is also worried about estimates that 10 truckloads of waste a day could be transported from across the eastern U.S. to a remote area of eastern Maine for 50 years.

The Maine site is within the drainage basin of the St. Croix River, which flows along the boundary of New Brunswick into

the Bay of Fundy.

At whatever site is chosen, the nuclear wastes will be buried far underground in a maze of mine shafts inside rock formations. In 50 years, the shafts will be sealed.

Of the 236 initial sites, one was on the Quebec-Vermont border, another on the Quebec-Maine border.

But the two were dropped following protests last year by environmentalists and local residents. As well, federal Energy Minister Pat Carney expressed concerns to John Herrington, U.S. secretary of energy.

Gooch said that Canada has received three commitments from the U.S.:

- No nuclear repositories would be constructed within 40 kilometres (25 miles) of the border;
- None would be within drainage basins flowing into Canada; and
- None would require geological exploration in Canada.

But an official with the U.S. energy department said yesterday that the U.S. has only agreed to one of the three.

Roger Gale, a senior official in the nuclear waste program, says the U.S. will not do any geological field work on Canadian territory.

Rock formations

Some of the proposed dump sites are less than 40 kilometres from American centres and "why should we protect your citizens any more than our own," he said.

So many of the primary sites are near the border, Gooch said, because most of the granite rock in the U.S. is located near there. And, more importantly, the border areas are generally far from major American populations centres.

"Political considerations will mostly determine where the waste dump will go," he said.

American officials — and Canadians who don't yet know all the details — are expressing similar concerns about both the process of selecting the sites and the criteria used.

One worry is the lack of time for consultation. Although the U.S. President is not expected to choose the eastern U.S. site until the mid-1990s, residents of the affected states have been given only until April 16 to make known their concerns.

Provincial Representatives' Meeting

Toronto THE SATURDAY STAR in English 15 Feb 86 p A3

[Unsigned article: "Ottawa Vows to Protect Water from U.S. Nuclear Dump"]

[Text]

OTTAWA (CP-Staff) — The federal government will seek assurances from the United States that if a major dump for nuclear waste is built near the Canadian border, it will not pollute waters flowing into this country.

Representatives from four provinces — New Brunswick, Quebec, Ontario and Manitoba — met yesterday with officials from the external affairs department to set up committees to study the legal, diplomatic and technical aspects of the controversial U.S. plan.

Last month, the U.S. energy department published a list of 12 of the most likely locations for a nuclear waste dump, one of which will be chosen in the mid-1990s.

One site is in Maine, two are in Minnesota and one in Wisconsin.

Got assurances

The dump would go into operation about 2006 and would hold radioactive nuclear waste and spent fuel now accumulating in storage pools around the eastern U.S.

Stan Gooch, chairman of the group and its representative from external affairs, said in an interview that Ottawa has received assurances from Washington the dump site ultimately chosen will pose no hazard to anyone.

The Canadians want to ensure than no contingency is being overlooked and that the Americans stick to their pledges, he

said.

"Those promises really are statements of principle. But it's up to us to ensure that they're implemented in practice."

External Affairs Minister Joe Clark has raised the issue with U.S. Secretary of State George Schultz at previous meetings and probably will do so again when the two men meet in Washington next month.

Several committees

Gooch said one subcommittee of his group now will study scientific and technical literature to determine the safety of U.S. techniques for transporting the waste to such a site, transferring it into the site and locking it into the ground so there would be no leakage for an indefinite time.

Another group will determine what legal and diplomatic weapons Canada would have at its disposal to ensure the safety of residents north of the border.

Gooch said the focus now is on the boundary waters treaty, which obliges both countries not to take any actions within their own territory that could result in a hazard on the other side of the border.

Along with provincial officials, Gooch's group included representatives from several federal departments and the Atomic Energy Control Board. It plans to meet again next month and will propose a meeting with American officials in April, he said.

/12851
CSO: 5120/31

CANADA

BRIEFS

NEW BRUNSWICK RADIOACTIVE LEAK--Saint John (CP)--New Brunswick Electric Power Commission officials at the Point Lepreau nuclear reactor near Saint John are beginning to get concerned about a leak of radioactive heavy water. They can't find it. The water is leaking at a rate of about 2.5 litres (half a gallon) an hour but is no danger to the public because it's flushed into huge amounts of sea water, said plant manager Roger MacKenzie. [Text] [Toronto THE SUNDAY STAR in English 2 February 86 p A17] /12851

DOUGLAS POINT LEAK STEMMED--Tiverton, Ont. (CP)--Workers at the closed Douglas Point nuclear station have managed to stem the flow of radioactive water leaking from the plant into Lake Huron. Ontario Hydro workers sealed a spent fuel storage bay, cutting the flow of slightly radioactive water to 454 litres a day from 2,200 litres. [Text] [Ottawa THE CITIZEN in English 14 Feb 86 p B10] /12851

CSO: 5120/31

BULGARIA

OBSSTRUCTION ENCOUNTERED IN CONSTRUCTION OF BELENE NUCLEAR UNIT

Initial Construction Difficulties

Sofia OTECHESTVEN FRONT in Bulgarian 25 Nov 85 pp 1, 4

[Article by Vladimir Rupov]

[Text] Editorial note: This major project was recently visited by group of editors. Discussions were held with the leadership of the city and the construction of the nuclear electric plant. These discussions gave us our initial impressions on the avalanche of problems which must be resolved here. Articles will be written in which an effort will be made to earmark more clearly some of the ways to resolve them. A cooperation contract was concluded as well with which the editors of OTECHESTVEN FRONT undertakes to help to resolve the main problems of the construction project and draw the attention of our public to them.

If the cushion of gravel on which the nuclear reactor stands were to yield by half a millimeter only, the reactor would work at no more than 50 percent of capacity. This is not only an impressive but an extremely strict and practically confirmed fact. No more than half a millimeter and not only hundreds of megawatts of power but also hundreds of millions of leva, rubles, dollars and marks would be lost....The percentage of losses shows no privileges and the type of currency will be determined by the carelessness of the official.

Simple arithmetic will produce an equation according to which the building of low-capacity nuclear reactors is much more advantageous, for if we were to lose half of the megawatts we would not have lost half of the capital investment. A 1000-megawatt reactor is at least triple the cost of a 500-megawatt reactor.

But then why are we building it? We are by no means the first to have asked this question, as we stand by the fields of the future Belene nuclear electric power plant. For the energy picture of Bulgaria through the next century will be shaped by the six 1000-megawatt reactors. Almost 50 percent of our electric power will be generated in nuclear electric power plants. However, this is not in the least any aspiration of prestige to be among the 10 highest

producers. It is the only possible choice if we want a secure support for a powerful economy and the growing needs of our way of life. Although the risk is not eliminated, it is well considered. Furthermore, the experience which has been acquired, the skill and feeling of responsibility of the construction workers substantially increase the reliability coefficient on the safety scale.

In the final account, the organization of the construction project, the time saved by installing much greater capacities simultaneously, the greater safety and the lower cost of the energy are incontrovertibly proving the advantages of 1000-megawatt units.

"The pouring of the gravel cushion is taking place under the strictest possible control," we were told by Hero of Socialist Labor Engineer Vasil Pankov, the chief of the construction project. "Even a tolerance of a minimal error has been excluded. Should there be a sharp drop in temperature and should the upper stratum freeze we would remove it and start pouring once again."

The bed in which the cushion will be poured is 21 meters deep. It has already been lined up with concrete on top of a firm marl rock. One hundred and twenty thousand cubic meters of quarried materials have been taken out of the Danube River and heavy machinery is preparing the "bed" of the first reactor. Another 200,000 cubic meters will have to be removed to provide the final shape of the cushion. These figures alone confirm Engineer Pankov's words to the effect that we are witnessing the largest Bulgarian construction project for the 20th Century.

A quick reference to the bulletin of the International Atomic Energy Agency proves that we are in step with world practices in the construction of nuclear power plants and that 1000-megawatt reactors are not the whim of a megalomaniac but a well planned strategy. An excerpt of a table in this bulletin confirms the fact: in 1982 the power grid of some countries included the following reactors, classified in terms of power: USSR: Smolensk 1, 1000 megawatts; Chernobil, 3, 1000 megawatts; United States: Lassalle 1, 1078 megawatts, Virgil Summer, 900 megawatts and Grand Half, 1, 1055 megawatts; FRG: Graffenhainfeld, 1225 megawatts.

We were told that Belene the only city on the Danube which has its back to the river. Now it must turn around and face it. Without the Danube the power plant cannot live. The river will provide the necessary water for cooling the nuclear reactors. However, turning a city around is not like turning around a person, the more so since this city should be facing the same direction as the power plant, i.e., it will have to be looking at the 21st Century. For the time being, the project has still not been proclaimed national and its initial steps are real tributaries. Suffice it to take a brief look at the flood fields to understand, even by people most ignorant of technology, that the equipment assigned here would be more suitable for the building of a large support facility than such a huge construction project.

However, this is merely the beginning. Equipment will be made available. Thousands of construction workers with their families will come.

Kindergartens and schools must be built for the children; each family will need a home and the market will require double and triple amounts of meat, milk, bread, fruits and vegetables. In all likelihood, a single movie theater will not suffice and the local library will have to add many books to its stock. Where will the wives of the construction workers work? Will there remain people working as mechanizers at the agroindustrial complex considering that salaries at the construction site will be much more tempting! Yet the Belene APK [Agroindustrial Complex] is one of the best in the country and the local leadership has made the firm decision that the agricultural structure here must be improved and that profits will not disappear so that budget subsidies may become necessary. Yet examples of decline of agriculture near large national projects do exist. It is as though the future nuclear reactors near Belene are loaded with a number of problems. We felt this tension even in Pleven, where we watched the video tape being taken to record some of the problems of the big construction project, by a special newspaper crew, together with Kuncho Kunev, chairman of the okrug people's council. What about Belene? Here it is as though we can feel the first moves of the earth's crust before the eruption of a volcano. However, no one is passively waiting, for this explosion must be controlled so that there will be no upheavals in the construction of this project which will be representative of Bulgarian construction for the last 15 years of this century and so that Bulgaria may begin calmly its discussion with the 21st Century.

Changes in Belene

Sofia OTECHESTVEN FRONT in Bulgarian 11 Dec 85 pp 1-2

[Article by videotaping crew: Mikhail Gorinov, Zakhari Nikolov and Boyko Kunchev]

[Text] We must admit that we were somewhat late arriving at the construction site of the second Bulgarian nuclear power plant on the territory of the Belene settlement system. This is the fourth year during which the efforts of designers and construction workers are focused in building, step by step, the new energy projects of the country which, together with the AETs [Nuclear Power Plant] in Kozloduy will account for nearly one-half of all the light generated in Bulgaria at the beginning of the 1990s, at the site of the ancient Roman city of Dimum dating from the 1st Century AD.

The need for electric power demands no proof: it is electric power produced in quantities which exceed current needs, according to the party's strategy, that is necessary in order increasingly to satisfy the steadily growing needs of the people and the development of the national economy.

As we said, we were somewhat late in concentrating on the building of the Belene AET, in the same way that concern shown for it had been slow on the part of a number of bodies, organizations, departments and leading economics managements. Naturally, we must take into consideration the condition and possibilities of the state, which are not unlimited. The videocrew dispatched by OTECHESTVEN FRONT dedicated its cassette No 4 to the construction of the second nuclear power plant.

We were unable to show the dynamic and prime beauty of the city of Belene, streets are already lively with traffic: people hurrying somewhere, most of them, not to say all of them, having linked their lives to the development of this city as the second capital (but why "second?" Chronologically, yes, but what about scale) of the Bulgarian nuclear power generating industry. Will Belene and its settlement system be able to suitably welcome the thousands of construction workers, installation workers and specialists (and, naturally, their families!) who will be coming from all over the country? Will we be able to catch up with the losses in terms of time, funds and labor? What is the current situation at this huge construction project?

It was as though Engineer Yordan Stoyanov, secretary of the general construction party committee at the Belene AETs was expecting this videocamera:

"We are currently engaged in the so-called engineering preparations for construction. For a number of reasons we are unable to implement our assignments. This has brought about the nonfulfillment of the engineering program for the five-year plan. For the past two years Energostroymontazh, the main contractor for the project, has been without a superior organization, which has delayed the solution of problems...."

To the best of its possibilities, the videocamera is recording the foundations of the construction site in this weather, which to say the least, is poor. It is here that the gravel cushion will be poured to support the hull of the main reactor. We spoke with two of the managers of this project, Engineer Tsocho Petrov, who represents the investor and who supervises the project, and Engineer Georgi Prodanov, one of the pioneers in the construction of the power plant. No work was under way at that time due to the poor weather. All in all, from the very beginning, the construction project has fallen more than 1 month behind. The reason is the lack of mechanization facilities. What the project needs is rollers, dump trucks and, above all, tents, which are lacking. Ordinary trucks are trying to run through the gravel, become mired and, as is natural, must be pulled out with bulldozers which have other duties and, for which reason, are in short supply. The pace is slow. The construction is already falling behind and its cost is increasing.

The small dam which has formed on the site of the so-called flood field, which should have been covered with dirt is the bitter consequence of all negative factors and the part with which we began our video recording.

We then recorded the site where the temporary settlement for the construction workers should have been built. We say "should have been," for so far all we can see here are a few trailers. The camera also shows a number of initiated yet slow developing activities. In order to cover the field, before the end of March 1986 some million tons of sand and gravel will have to be extracted from the Danube River. There is already a delay of almost 2 months. Also delayed is the building of one of the main projects--the concrete production plant, which is one of the most important, for next year it is scheduled to produce the first quantities of concrete for pouring the foundations of the reactor. The various specified types of armature iron are not being received

rhythmically. Yet, this project will determine subsequently the next one, we were told by another of our interlocutors, Engineer Mitko Kevov.

Can only seven or eight people build the port of the power plant, which should have (again that "should have"!) been completed by the end of 1985? According to Engineer Bernard Slavov, talking to the videocamera, so far only half of the plan has been fulfilled!

It seemed to us somewhat unexpected to see a woman here: Engineer Vyara Todorova, who is the manager of the building of the warehousing-production plant; we recorded her energy and concern. By the end of August, 800 of the 18,000 cubic meters of reinforced concrete structures contracted for 1985 had been received. This as well, as we pointed out, is slowing down the construction of the plant and the consequences are major.

"We see two cranes here," we recorded in the next part. "However, today they were not working, for the prefabricated elements had not been supplied. This is costing money because of the idling and, furthermore, today the construction has not progressed. Nor are the supports for the roofing elements available, thus dooming the latter to destruction. The reason is the fact that their transportation from the producing plant in Ruse had not been organized.

We also filmed the areas on which the building for special metal structures should have been constructed. The elements are arriving but due to lack of workers and equipment the construction has not been started.

"There are very few of us to undertake so much at the same time," Engineer Vyara Todorova concluded.

"How do you imagine the city after the completion of the nuclear electric power plant?" was the only question which we asked people on the streets. The answers were optimistic:

"With more young people!"

"With more housing, institutions for children, schools and cultural establishments!"

Milin Nikolov, chairman of the executive committee of the obshtina people's council, summed up the impressions:

"The pace at which the basic structure needed to meet social requirements is developing does not meet the needs of Belene with its 30,000-population over the next few years (currently this is a city of 10,000 population)."

Our "Videoconclusion:"

We expect that the decree to be promulgated by the Council of Ministers on the construction of the Belene AETs will formulate the problems properly and they will be resolved successfully. Our people, who build Dimitrovgrad, Kremikovtsi, Devnya and the Kozloduy AETs, who build huge heavy machine

building enterprises, will find the strength and means to build its second nuclear electric power plant in Belene.

We developed this feeling as we studied the problems and met with the personnel and managers at the construction site and as we were trying to document it in the fourth video film, which we named "Between Optimism and Problems." Anyone who feel responsible for the present and the future of the Belene AETs can see our editorial videocassette No 4 and give us his optimistic answer.

High-Level Seismicity

Sofia OTECHESTVEN FRONT in Bulgarian 12 Dec 85, pp 1-2

[Article by Vladimir Rupov, Todor Tsvetkov and Yani Boychev]

[Text] In terms of nerves and wasted time, in waiting, as our editorial practices certify, trying to talk by telephone with Engineer Vasil Pankov, chief of the construction project at the Belene AETs from anywhere in the country, is the equivalent of a telephone conversation between Sofia and Katmandu. It would have been much simpler if Engineer Pankov had been in Moscow, London or New York.

If you happen to miss the train from the Oresh station to Belene you would have to wait for the next train more or less as long as it takes an artificial satellite following a specific trajectory, to circle the earth twice.

The point has already been made that any comparison is "lame." So are, probably, ours, the more so since there are people who will point out quite a number of "objective" arguments against them.

Nevertheless, the truth remains. We further clarified this truth in the course of our meeting with the management of the city and the construction project of the nuclear power plant, as a continuation of the discussion which was filmed by the OTECHESTVEN FRONT videocrew the previous day. The flood of thought which were expressed, alas, does not lead to any sensational conclusion. Rather, it is charged with the same type of tension and high seismicity as that of the Belene soil.

Sufficient for a Sports Complex but not for a Nuclear Power Plant

For centuries dark and sinister legends have roamed the swampy waters near Belene. Many fishermen failed to return home, swallowed, in all likelihood, not by sinister forces but by the treacherous mire which lines the bottom of the Svishtov-Belene swamp. Here and there little parts of arable land could be found. The main occupation, however, was fishing. The swamp was drained off after 9 September and the mosquitoes and malaria were forgotten. However, the treacherous nature of the soil remained. The simple crossing of the area is a headache. That is why drills at several meter intervals have tried to detect the most solid foundations for the nuclear power plant. Yet such foundations should cover neither 2 nor 20 decares. The area to be covered is quite impressive--2,800 decares. Furthermore, no "wholesale" waste of land is

allowed. The construction site is maximally condensed. Therefore, if we are to make a comparison with the pioneer of our nuclear power industry--the Kozloduy Nuclear Electric Power Plant (in the course of our discussion such comparisons became frequently necessary), we would see that the efficiency per square meter of "nuclear" soil is much higher, for many more capacities (6,000 megawatts as compared to 3,670 in Kozloduy) will be built on a smaller area.

Actually, any comparisons with our first nuclear power plant are not triggered by the desire to emphasize differences between these two energy giants. The word "Kozloduy" is mentioned 26 times in the 23 pages of the record of the Belene discussion. Kozloduy means, above all, experience, both positive and.... cautioning and, in some respects, instructive.

The study of experience, naturally, did not lead to any new super-discoveries or super-original decisions. The necessary interpretation simply led to rational solutions. Today all buildings of the bases which will parallel the main production will not have to be destroyed not to hinder the expansion of the power plant, thus senselessly destroying capital assets. Initially, this seems as simple as the egg of Columbus. The question, however, is not one of thinking about it but of learning from it.

Experience has indicated that the construction workers here would like that a basic construction feature be respected: initially the construction of the underground facilities of the site which, unfortunately, is quickly ignored, in order to avoid the building of such facilities parallel (or subsequent) to the basic construction. Once again, experience has indicated that the violation of this rule leads to the creation of a rather unpleasant and confusing maze.

Desire, however, is one thing and reality is something entirely different. That is why, along with optimism, concern is hovering over the construction projects: shall we be able to complete everything as we intended? Will every unit, brigade and individual work rhythmically or will time be wasted as a result of which, in the final account, three workers will be crowded in a space of 2 square meters and their main concern will be to avoid obstructing each other's work.

Avoidance of such a cluttering would be the ideal choice and an unattainable masterpiece of construction organization in our country. But let us remain optimistic and describe the situation at the construction project as it is today.

Engineer Nedko Nedkov, director of the investor's office:

From the investor's point of view, the most important thing now is to speed up the drafting of the blueprint. This will open the way to the basic planning of the plant. In turn, this will lead to the conclusion of contracts for equipment procurements. It is very important for Energostroymontazh, the construction organization, to strengthen in 1986 and truly become the main contractor for the basic power equipment.

Engineer Vasil Pankov, construction project chief:

We need the Council of Ministers decree on the accelerated construction of the Belene AETs as soon as possible. For the time being, we have no privileged status in terms of recruiting people from other projects, although such people are available. The decree will open the doors of many departments, some of which seem to have been totally ignorant of our project to this day. The decree will also guarantee funds and resources.

Problems for Discussion and Thought, Addressed to Ministries, Departments and Okrug People's Councils

Years ago there were eight trains per day from Oresh station to Belene station. Today there are three. The justification is the insufficient passenger load and the unprofitability of the train. However, a high concentration of people is expected in Belene the very next year. Specialists will come here from the country and abroad. Would it be impossible to assign a motor coach with even a single car, which would make the railroad transportation schedule more acceptable? Is it possible for the Ministry of Transport to ignore its departmental interests somewhat?

A telephone exchange is being planned. However, until this is completed, until it is built and commissioned, most likely many people's hairs will turn white (at best). However, the Ministry of Communications has its schedules and deadlines as well. They may be considered suitable by the Ministry but...

A high percentage of the freight (more than 2 million tons) has been assigned to the "Automotive Transportation" SO [Economic Trust], considered under the rubric of "technological transportation." Consequently, the trust is outside the range of departmental interests. Nevertheless, such freight must be hauled. For the time being, transportation facilities (and not only they) are adequate for the building of a sports complex, but not for a nuclear power plant.

People will be assigned to work at the project by powerful construction organizations, such as the Assemblies DSO, Khibrostroy DSO and Industrial Construction DSO. What type of cadres, from where and when will they be redirected to Belene are problems which must be resolved in advance. A spontaneous influx of manpower into the city has already started. This will inevitably lead to conflicts, disorder and chaos.

Housing is Being Sought Along the Danube

The land here is highly seismic. The builders of the power plant are taking this fact into consideration. Whether or not the earth will ever shake is something for nature to know. Mathematicians can only compute the fact that this will occur according to the theory of probabilities. However, the peaceful atmosphere in the city, which prevailed until recently, is now charged with even greater seismicity, which exceeds the Richter or Medvedev, Sponcheier and Karnik scales.... It is of a social nature, which means that it could be controlled and an earthquake avoided. We are expecting in the immediate future for the seismologists to forecast earthquakes. Meanwhile,

here, all above the earth, the possibility of an "earthquake" has already been confirmed, given a certain amount of inaction.

Kiril Angelov, first secretary of the Belene Obshtina BCP Committee:

Poor preparations for such a major construction project will create a super-tension. Funds will be wasted and there will be human "spoilage." Our task currently is to prevent conflicts between local cadres and construction workers. We have explained the problems related to building a nuclear power plant. It will be necessary to restructure the entire economy of the obshtina and to subordinate it to the construction project.

Above all, housing! This phrase has almost turned into a slogan. However, what type of housing is the question, posed not by us alone. Will they be huts, or single-family housing with yards, or else the familiar term "residential district" spoil the Danube shore? The management of the settlement system has taken the categorical view that Belene must become a beautiful city with its own original appearance. It must become the "pearl on the Danube." How to build essentially single-family houses with yards and gardens and how to harmonize the residential complex with the environment? However, so far the construction done does not meet these requirements. It would be quite interesting for the development of the regional design organization to be applied not directly but, as has been frequently done elsewhere in the world, to be submitted to the public for its views. Another major problem which involves a great deal of question marks is what should come first: the construction of the housing or the power plant? Or else, should they take place on a parallel basis?

At the beginning of 1986 thousands of people will come here. Apartments are being sought in the city and the surrounding villages. However, these are palliatives which, although necessary, are merely a temporary step. The urban construction plan has been drafted. However, it is inadequate if it is to prevent the "pearl on the Danube" to turn dull even before it starts shining.

Not all construction workers are bachelors. That is all right, but where will their wives work, and where will their children go to school? For the time being, it would be suitable for such children not to be older than six, for places in kindergartens exist. An agreement has been reached with Farmakhim to build a shop as a result of which the coexistence between a cosmetics industry with the nuclear power industry offers an original solution. However, why should we wait with the construction of this shop?

The AETs-APK is the Gordian Knot

The old swamp with its "sinister forces" and dark legends is now fruitful land, owned by the agroindustrial complex which, so far, is one of the best in Pleven Okrug. No specific description of the complex is necessary. It has an excellent dairy farm, intensive crops and profitable production.

The AETs is not stolen land, for the 1,000 decares needed are underproductive, frequently flooded by spring waters. The humus has been removed from 1,500

decades of fertile first category land and laid on other previously unused soil. The first shock has thus been avoided.

Kiril Angelov:

Our plans include agriculture which will satisfy the needs of the construction project. However, we are unwilling to be subsidized, as was the case with agriculture near some large industrial construction sites. We fear, however, that unless we are able to master the manpower draining process on time, in 5 years there will be no one even to receive subsidies. We would like our APK to be retooled quickly and acquire modern equipment and use new technologies. This will result in higher productivity and increased wages. We would be committing a crime if we wrecked this complex.

Meanwhile, however, opposite views are already being voiced in the okrug. One is that the agroindustrial complex should become an appendage (properly described as "auxiliary farm") of the power plant, at which point the temptation of higher wages will be eliminated. Another view is that agriculture should develop independently. It must be modern and highly intensive. It should represent a closed cycle consisting of small processing enterprises, for milk, bakery goods, meat products and carbonated beverages (this also is a firm foundation for resolving the problem of female employment). The view of the National Agroindustrial Union remains unknown. However, even that view will not suffice. As the sociologists say, this is an open question. However, it is not a question of endless delays or hasty solutions. The proper answer to the equation with many unknowns is that the agroindustrial complex must not be allowed to sink. It must not go down into the Svishtov-Belene swamp which has already been drained off and is safe. It must not disappear in the storm of the nuclear reactors. The formula remains to be found.

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BULGARIA

CONSTRUCTION OF KOZLODUY NUCLEAR STATION FACES DIFFICULTIES.

Sofia RABOTNICHESKO DELO in Bulgarian 6 Dec 85, pp 1, 3

[Article by Engineer Oved Tadzher, representative of the Council of Ministers
Bureau: "Forward but with Inadequate Speed"]

[Text] The timely start-up of the fifth energy block at the Kozloduy AETs is self-evident. Thanks to the steps taken by the BCP Central Committee and the Council of Ministers, significant labor and material resources have been concentrated on the project. Many problems related to providing the necessary materials have been resolved with the help of the Ministries of Construction and Settlements and Energy, as well as the associations participating in the building of the project. Many enterprises throughout the country, to which we turned with emergency orders, responded with great willingness and total understanding.

It was thanks to all such measures that procurements with materials and equipment improved significantly. The annual plan for the basic construction of block No 5 is being overfulfilled. Although the plan for construction and installation projects for 1985 was increased by 50 percent, the collective fulfilled its task by 30 October.

The main target of construction and installation workers is to undertake the circulation flushing of the reactor section in honor of the 13th BCP Congress. This will prove the readiness of the main technological systems of the first circuit. The second main task is the testing of the steam turbine in the old part of the plant. This will test the readiness of all systems of the second cycle as well and eventual omissions will be eliminated.

If these tasks can be implemented successfully and within the stipulated deadlines, adequate prerequisites will be established for the initiation of start-up operations at all systems during the month of September and October 1986 as well as preparations for the commissioning of the block. The remaining operations must be completed before the autumn-winter season has arrived.

Schedules were drawn up and resources needed for the implementation of such objectives determined with the great help of the Soviet specialists. Unfortunately, such schedules and programs are not being implemented. Many construction and installation organizations, manufacturing plants and design

organizations and ministries are poorly implementing their obligations. They repeatedly make promises and issue deadlines which they subsequently change.

The Industrial Construction DSO [State Economic Trust] failed to complete construction at a number of subprojects and to create conditions for work in winter. Poor work is being done by branches in Ruse, Pleven, Siliistra and MSK in Kazichene, which have violated their deadlines repeatedly;

The Main Administration of Construction Truths has fallen behind in completing the underground structures;

The main organizations--the Industrial Construction Enterprise in Kozloduy and Energostroymontazh, in Kozloduy, are also violating their deadlines;

There is a great delay in installation work. The need for 570 highly skilled workers is particularly urgent.

Briefly, delays are growing with every passing day and planned deadlines are being violated. Currently the pace at which installation work is being carried out is about 80 percent of the planned figure. The fact that the task can be fulfilled yet schedules are being violated on a daily basis is creating concern among the collectives, in the party organization and among the project's management.

Major difficulties are caused by procurements of some imported or locally produced types of equipment. We are also concerned with the question of procuring sealed sluices produced at the Heavy Machine Building Plant in Radomir, without which the construction part of the reactor section cannot be completed during the winter and nor could any tests made of the sealing, which should take place before the circulation flushing.

Experience acquired in the operation of nuclear power plants using the same type blocks in the USSR proves that their successful utilization is possible only after the completion of all construction and installation projects and start-up tuning operations, most of which are carried out by the operational personnel. Some members of this staff have still not been appointed due to the lack of housing. Yet the program for completion by 30 October, despite all guarantees given by the Vratsa Okrug People's Council, has been implemented no more than 60 percent. This is having a rather adverse effect on the recruitment of skilled cadres.

Council of Ministers Decree No 11 stipulates the commissioning of block No 6 to take place in June 1988; this means that construction and installation work must be completed in 1987. Virtually no work was done on this block this year for lack of workers. It was only in October that work on the main hall was initiated. However, the pace is unsatisfactory.

Nevertheless, the collective is fully confident that the deadline will be kept. In order for this confidence to become reality, we must urgently, even before the end of 1985, establish and approve the specific resources which will be allocated in 1986. Important problems must be resolved in 1986. However, we are already noting delays in metal and material procurement. For

more than 4 months the metallurgical industry has been unable to produce metal for the machine hall. No contracts for the procurement of imported equipment have been concluded. Only a few days remain until the end of the year, and the collectives are still unaware of their 1986 assignments and the amount of already procured resources. The plan for material and technical supplies for the first quarter remains unratified and a large percentage of metals and materials needed have special features so that their procurement requires a longer period of time.

The organizations participating in the building of the power plant have accumulated significant experience. The sixth block will be built on the basis of new technology with maximal application of existing domestic and Soviet experience. Possibilities will be sought for changing the designs. It is planned that after the commissioning of block No 5 the manpower will be reduced as the result of improved labor organization and new design. The main thing, however, is for the good intentions not to remain on paper only. This will require of new developments in the work, such as target planning, construction based on firm contractual value, target deliveries of materials, resources and mechanization facilities, etc. Adequate conditions have been provided for such a new approach: block No 6 will be built on the basis of the same design. Consequently, a real base will exist for planning and resource support, which will be based on the design documentation. However, such a target approach is not being applied currently. Serious steps must be taken to lower the cost of the block by reviewing the cost of machine-shifts, computations and the cost of equipment.

The design organizations face a very important task. Block No 5 is being built on the basis of partial planned readiness; designs are supplied only 2 to 3 months prior to the initiation of the construction or the assembly work. This does not allow normal planning and a great deal of funds and manpower were wasted in eliminating design disparities. The recurrence of such errors in block No 6 should be eliminated. This is a prime task of the design organizations which, however, are still not implementing it properly. The designs for block No 6 largely repeat the errors of block No 5 and are also being delivered with delays. Nor should we ignore the requirement that projects must reflect all constructive solutions based on the new plan for the organization of construction.

Currently the main efforts are focused on the completion of block No 5. Meanwhile the problems of the second 1000-megawatt unit tolerate no delay and must be resolved in the shortest possible time.

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BULGARIA

DELAYS IN CONSTRUCTION WORK OF NUCLEAR UNIT IN KOZLODUY

Sofia TRUDOVO DELO in Bulgarian 3 Jan 86 p 1

[Article by Lt Col Stoyan Tsenov: "Kozloduy AEK [Nuclear Power Combine]: Plus-Minus Balance"]

[Text] The subunit in which Officer Ivanov is serving is building the underground engineering facilities for the fifth and sixth power blocks of the Kozloduy AEK.

In 1984 and 1985 it built 34 kilometers of cable, water main and sewer beds and hundreds of revision and collection shafts.

The subunit fulfilled its construction assignments for 1985 in terms of volume as early as 30 November 1985; by the end of the year it completed additional construction and installation work worth another 150,000 leva.

These results indicate that the assessment of the activities of this army collective should have been positive but...there does exist a "but" which moves the arm of the scale to the minus sign.

This applies to the lagging which occurred at the end of 1985 in five central areas of the project.

The lagging ranges between 10 days and 1 month.

What are the reasons? Who is to be blamed? What steps are being taken to heal the military collective from the dangerous disease of "rewriting deadlines?"

Let us not spread ourselves too thin and consider only two of the five lagging sectors: subprojects "Underground Engineering Facilities Between the Diesel Generator Station--Two Cells and the Reactor Section" and "Shafts for the Sprinkler Basins." These projects were entrusted to the squads commanded by Officers Urumov, Dinovski, Mikhaylovski and Petrov.

For what reasons has the construction of the first project been delayed?

The Assembly DSO [State Economic Trust] was late in providing the co-performer of the assembly project with specifications for the additional pipelines for nitrogen, sulfur and air; the representatives of the permanent authorship supervision provided by the Energoproekt Engineering Organization in Sofia were late in providing the route of the track for the industrial pipeline: the groups of "Plant Construction" were 14 days behind in clearing the tracks of existing subcrane engineering systems; the Assembly DSO was also sluggish in beginning work on the thus open front.

I saw the way the muddy and oily waters which poured out of the reactor section were able to cover in a matter of seconds fresh concrete poured in one of the channels for cables and how half a day worth of labor by the boys of the squad commanded by Lt Petrov was wasted.

The construction troops sluggishly broke up and cleared the additionally discovered concrete blocks near the reactor section.

Matters are simpler at the second project. The reasons caused by outside factors are minimal, and nothing prevented the subunit from completing the shafts on time, the more so since the sprinkler basins have been ready for almost 2 months.

The situation now has changed radically. The order issued by Comrade Oved Tadzher on the timely and qualitative completion of the construction work is being explained in a businesslike manner. Work is being done in two shifts and efforts are being made to make every hour count.

The military personnel are convinced the assignments will be completed on time and that the subunit will not be the reason for any delays in the start-up.

The soldiers are making efforts for the assessment of their work to shift from negative to positive where it has been throughout all construction done so far in the underground engineering facilities of the 1000-MW reactor.

5003
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BULGARIA

SHORTCOMINGS AT CONSTRUCTION SITE OF NUCLEAR UNIT IN BELENE

Sofia TRUD in Bulgarian 9 Jan 86 p 1

[Article by TRUD correspondent Dimcho Khitov: "Construction on a Broad Front at the Belene AETs [Nuclear Power Plant]"]

[Text] Before the foundations of the first reactor are poured on, the efforts are concentrated developing a normal work environment and living amenities.

The rumbling of hundreds of dump trucks and thousands of human voices can be heard in these January days, on the fog-covered roads of the Belene AETs. Earth is being removed along the roads, bulldozers and scrapers are crawling and gantry cranes are leaning. Here and there the fronts of residential and auxiliary buildings emerge.

The deep foundations of the first energy block are being filled with a many-meter thick sand cushion with increasing speed. The foundation of the reactor will rest on them. The construction workers are hurrying to catch up with their lagging during previous years and to be in step with the new schedule.

"Belene is the second AETs but will be the first in terms of capacity," says Vasil Pankov, chief of the construction site. "It will consist of six 1000-megawatt reactors. The first power block will be commissioned in June 1991 and one block will be commissioned every 2 years after that. In other words, by the year 2001 the Belene AETs will be completed and will generate billions of kilowatt hours of electric power to meet the needs of our country. At the peak construction years, such as 1990, as many as 20,000 workers and specialists will be at work here and construction and installation work worth 210 million leva will be completed. Due to a certain lagging in engineering preparations and residential construction, 1986 and the entire 9th Five-Year Plan will be a period of considerable efforts and trials for all of us. Because of insufficient funds, in the past years we have constructed 360 housing units; 4,500 will be needed during the 9th Five-Year Plan. The city of Belene, which is the closest to the construction site, does not have good commercial procurement systems due to the lack of commercial warehouses; it has insufficient institutions for children and schools and its transportation connections with Pleven and the rest of the country are poor. Yet this year alone the number of construction workers at the project will more than triple, totaling 5,500 people.

Actually, what has been and what remains to be built for the work to go well and in order to meet the planned start-up deadline for the first power block? During the so-called period of "preparatory construction of the Belene AETs in the 8th Five-Year Plan" the road to Svishtov was completed. A boiler facility was built for residential and production needs, a repair-warehousing base, a new concrete plant with a capacity for 3,000 cubic meters of concrete per day, a consumer services combine and a worker polyclinic with a hospital capable of caring for 25,000 people; two other housing blocks totaling 1,040 apartments are nearing completion. Work is progressing also in pouring the multiple-meter deep sand cushion. The flood areas have already been covered with dirt and on the eve of the 13th BCP Congress we shall begin pouring the foundation on which the bed of the first power block of the plant will rest."

At the same time, as is the case with any new major project, Belene has problems which concern the construction management and the people who have come to work here. On the one hand, they are caused by the delayed planning of some of the basic AETs subprojects, the fact that the wages of construction workers have not been equalized with those paid at the Kozloduy AETs (because of the delayed classification of the construction project as national) and, on the other, there are problems related to consumer services.

Belene, a small city distant from the okrug center, located along the Danube River, which itself is experiencing difficulties in trade and transport services, must all of a sudden meet the needs of several thousand guests--construction workers. How can this be accomplished without a bus terminal and with only two trains linking it with the Oresh railroad station, and with children's institutions and schools based on meeting Belene's current needs?

"With the help of the okrug party, economic and trade union managements and representatives of trade and transportation organizations in Pleven," answered Milin Nikolov, chairman of the Belene Obshtina People's Council, "we drafted a specific program with specific individuals in charge and deadlines, aimed at the fast resolution of social, housing and other problems of construction workers, the number of whom will continue to increase in this area. The first four stores have already been opened on the ground floors of the residential blocks and we are planning for two more. We have provided land and financing for three children's establishments and a school. We have made available a construction area and are planning a bakery, a new bus terminal and the creation of a commercial warehouse. We are currently looking for and registering all available private premises for the construction workers. We are reconstructing and updating restaurants and cafeterias. Our transportation facilities to the okrug center and other settlements are still inadequate. We have no regular lines."

The combined program for resolving the problems of construction workers at the Belene AETs has been made part of the plans of all Pleven and Belene bodies and organizations and the implementation of the various measures is being controlled. The construction and installation combine in Pleven must build 1000 apartments for the construction workers, made of prefabricated panels, 600 of which have priority deadlines. By September a camp with temporary huts for 1000 people must be completed and a hostel is being designed.

"According to the program for the accelerated construction of the Belene AETs," says Georgi Angelov, director of the Pleven Automotive Vehicles Combine, "this year we shall assign an additional 40 trucks and 10 buses with a view to improving transportation services for the construction workers at this major project."

The construction of the Belene AETs is already becoming the concern and destiny of the steadily increasing number of construction organizations and thousands of workers and their wives and children. Construction and installation workers, investors, designers, drivers and auxiliary workers from all over the country are already arriving here. According to Soviet documentation and with the help of Soviet specialists, the second (but more powerful) AETs in our country will be built along the Danube River. It will produce and reliably dispatch the necessary electric power we shall be needing in the future.

5003
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YUGOSLAVIA

NUCLEAR POWER PLANT PROPOSALS DRAW CRITICISM

Objection at LCY CC Session

LD211536 Belgrade TANJUG in English 1414 GMT 21 Feb 86

[Text] Belgrade, February 21 (TANJUG) -- At today's Central Committee session of the League of Communists of Yugoslavia (LCY) an objection was raised to the construction of new nuclear power plants in Yugoslavia.

LCY Central Committee member Dragisa Ivanovic, former rector of the Belgrade University, referring to the recent opening of a public bidding for the import of nuclear power plants, stressed that this decision should be revoked out of political, scientific-expert and financial reasons. He said that the construction of new nuclear power plants Yugoslavia would incur a 20 billion dollar debt, the figure practically equal to the country's present external debt.

In Ivanovic's opinion Yugoslavia has sufficient coal and water to cover its energy needs. The import of nuclear technology and fuel, Ivanovic warned, would be a blow to the country's independence, so that on such important decisions the broadest possible discussion should be organised.

Yugoslavia already has one nuclear power plant. For some time now the public has been asking more and more frequently whether the construction of new nuclear power plants is justified, in view of the fact that an ever growing number of other countries are giving up the use of nuclear energy for the production of electricity. A particular problem is the fact that a solution has still not been found where to store the radioactive waste.

Upholding the protection of human environment, delegates of the Yugoslav town Slavonska, Pozega municipality, yesterday rejected a proposal that the storage for the nuclear waste from the first nuclear power plant in Yugoslavia "Krsko" should be built in their district. The neighbouring municipality of Nova Gradiska recently took the same stand.

The clause on the protection of human environment has been included in the Yugoslav constitution and this is the first such instance in the world.

Public opinion polls carried out in 1980, 1982 and 1984 in the Yugoslav Republic of Slovenia where, on the border with the Yugoslav Republic of Croatia the a-power plant Krsko has been built, show that the number of those objecting to the construction of nuclear power plants in Yugoslavia is continually increasing.

'Disturbing the Public'

AU232129 Belgrade Domestic Service in Serbo-Croatian 1800 GMT 23 Feb 86

[Milutin Milenkovic "commentary" on the project of building nuclear power plants]

[Text] Now we are not going to observe the project of nuclear power plants from the point of view of economic and technological suitability, nor from the point of view of a danger to people and nature. We are not skilled to do that and do not want to take sides. Coming to us, however, are some specific and topical observations about a phenomenon that occurs very frequently, is noticed with reproach by most authorized sociopolitical or state factors, belongs to our domain, and is disturbing the public.

A milder or a stronger state of agitation on the part of the public undoubtedly belongs to so-called social pathology. As in the case of illness of any organism, the capability for a regular flow of all vitally important functions decreases in this fever; work suffers; neurotic confrontations, rage, and aggression amount; and it is not only the working energy and consciousness of an individual that suffer, but often also the health of the people who are caught in the net of unpleasant facts the solving of which they cannot directly influence.

Because of all this, upsetting the public is a socially harmful phenomenon, and the inciters of the phenomenon who act irresponsibly, maliciously, and from erroneous starting points bear, or should bear, legal consequences as well. Examples of such responsibility are many and almost all pertain to something that has been done in a way it should not have been done. There are almost no examples of responsibility demanded for something which has not been done and should have been, and a larger damage in public feeling ensued because of untimely information or denial of information.

The debate at the latest session of the LCY Central Committee and the reaction to it in the broadest public have confirmed the fact that the public is more gravely upset as a result of failure to perform necessary actions. As a rule, it is easier to correct wrong information than to solve and repair the concealment of information.

When a LCY Central Committee member and a recognized expert for nuclear power reaches such a degree of upset and warning that he has to cry out from that forum's rostrum: Let us not allow a rope to be put around Yugoslavia's neck, then this is a situation which demands responsibility from those who created it.

The statement that Comrade Milka Planinc, president of the Federal Executive Council, made at the same LCY Central Committee session had a calming effect to a certain extent. She said that this society, we quote, certainly will not allow solving the problem of nuclear power plants without a most serious debate, and so on. However, have not the stages of decisionmaking already gone too far without such debates being opened and the public being appropriately informed?

It is not strange that the nuclear topic is very much talked about in public these days, and that is done in a concerned and complaining way. And the words said by Comrade Ckrebic, president of the Presidency of the SR of Serbia, that such questions can be solved only by unified Yugoslav plans and by consensus is being used even for the appointment of any higher official of the federal administration, we will hope-

fully not allow the Adriatic, the currents of the Danube and the Sava, and other resources of which the whole of Yugoslavia and the health of all Yugoslavs depend, to be poisoned by any expert or economic-political group inspired at least by narrower interests.

We would therefore like to see in the statement made by the President of the Executive Council something more than an individual promise. This should represent an unambiguous obligation that really nothing be done in the application of nuclear power in the form of nuclear power plants without fully informing the public and without the deepest professional coordination.

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YUGOSLAVIA

BRIEFS

AGREEMENT WITH SOVIET FIRM--Representatives of the SOUR (composite organization of associated labor) "Djuro Djakovic" in Slavonski Brod and the Soviet firm "Atomenergoexport" have signed an agreement in Zagreb on exporting about \$20.25 million worth of nuclear equipment. Accordingly, "Djuro Djakovic" will deliver 11 complete sets of equipment for nuclear power plants in 1987 and 1988. Cooperation between these two firms began 10 years ago during which time over \$168 million worth of equipment was delivered to "Atomenergoexport." [Text] [Belgrade PRIVREDNI PREGLED in Serbo-Croatian 25 Feb 86 p 12] /12947

CSO: 5100/3025

ARGENTINA

LEAK REPORTED IN CORDOBA NUCLEAR POWER PLANT

PY121504 Buenos Aires NOTICIAS ARGENTINAS in Spanish 1220 GMT 11 Mar 86

[Text] Cordoba, 11 Mar (NA)--The director of the Embalse Rio Tercero nuclear power plant, Eduardo Diaz, today revealed that a 3-week-old leak in one of the secondary circuits at the plant is allowing heavy water to escape in the direction of the lake. He added, however, that the breakdown "does not pose any danger to residents of the area or to the environment."

Diaz explained that the leak was detected approximately 2 weeks ago [as received], "but that it has not reached radioactive levels that would harm the environment." He said that "at this moment, these levels are equivalent to just 20 percent of the allowed minimum radioactivity levels set by the advisory committee for licensing nuclear facilities," which is the agency charged with granting licenses to and supervising operations at nuclear power plants.

The plant director also stated that this is a "common problem" in the operation of a nuclear power plant and that there are "contingencies for overcoming this type of breakdown."

Diaz explained that the nuclear power plant has three independent circuits through which different types of water circulate.

The primary circuit contains heavy water, the secondary circuit transports demineralized water, and the third circuit takes water from the lake to be used in the cooling system.

One of the 7,000 conduits through which heavy water is circulated at high temperatures suffered a crack through which liquids are passing to the secondary circuit at a rate of 7 kg per hour.

Nuclear power plant technicians state that "that level is not concerning," although some of the water contaminated with radioactive elements is being leaked right next to the Tercero River, which is located some 150 km south of Cordoba where the nuclear power plant is located.

In turn, National Commission for Atomic Energy (CNEA) Chairman Pedro Constantini has sent a telex from Buenos Aires to the Cordoba Environmental Agency, stating that "the heavy water loss does not pose any risk to man or the environment," and that the breakdown "will be repaired within 10 days."

/6662
CSO: 5100/2050

BRAZIL

GOLDEMBERG URGES SUSPENSION OF NUCLEAR ACCORD WITH FRG

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 31 Jan 86 p 2

[Text] Professor Jose Goldemberg yesterday advocated before the Committee on Evaluation of the Brazilian Nuclear Program in Rio that substantial changes be made in the Brazilian-German nuclear agreement, to permit greater domestic participation in the sector. The rector of the University of Sao Paulo suggested that the country should abandon the idea of pursuing construction of the Angra-3 nuclear plant, and should continue the agreement with the Germans only up to completion of Angra-2, "and that, only because there is no choice."

"This idea that once project are begun they cannot be abandoned is not right," the professor said. "Now that the urgency in getting a nuclear program underway is over, we are ready to begin again." According to Goldemberg, to begin the nuclear program again on new bases would mean "building nuclear reactors in accordance with our needs." "Obviously this new project would be much more national," he added.

The USP rector said that the International Atomic Energy Agency itself advocates the use of small capacity reactors in developing countries. "Perhaps this is an opportunity for Brazilian industry," he commented. "As in the aviation industry, we are not building Boeings, but we are competing in the international market within the line we do produce." The professor brought from Sao Paulo the observation that "the national industry does not want to know anything about NUCLEP (Nuclebras Heavy Equipment), not in any color."

"We know that the project to build reactors in Iguape is on hold for an indefinite period of time, and this is a good opportunity to reconsider the future," he said. "We are going to complete the Angra-2 nuclear plant, because there is no other choice. Now, I would be very cautious with Angra-3."

Goldemberg disclosed that equipment purchases for the Angra-3 nuclear power plant already account for 60 percent of the total estimated, which, according to him, is customary for the sector, as it usually acquires equipment as quickly as possible to complete the projects. "This equipment we have already bought can be exported to other countries, and will help pay our foreign debt, which has built up in large part as a result of this nuclear program."

The USP rector said that the best course to follow would be to freeze the rest of the nuclear power, opening the way for greater national participation in the sector. "The next reactor to be built in Brazil should follow this principle," he concluded.

9805/12951
CSO: 5100/2044

BRAZIL

REPORTAGE ON REEVALUATION OF NUCLEAR PROGRAM

Evaluation Committee Meeting in Sao Paulo

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 17 Jan 86 p 5

[Text] The 17 members of the Committee for Evaluation of the Brazilian Nuclear Program are meeting today at the Sao Paulo office of Furnas. The topic of the discussions was not revealed by the Ministry of Mines and Energy. "The work of the group is secret," according to Olberes Pizao, a ministry representative in Sao Paulo. The committee has been reevaluating Brazil's nuclear program since September of last year, when it was created, and has until March to complete its work.

A number of the committee's members has been in Sao Paulo since yesterday, including its chairman, Jose Israel Vargas, an advisor for nuclear affairs at the ministry. They were at the Energy and Nuclear Research Institute (IPEN) at the university "in a working meeting," according to reports by an official.

IPEN participates in the parallel nuclear program begun in 1982 by the National Nuclear Energy Commission, with the support of private enterprise. It is already producing hexafluoride from uranium and developing all the equipment and materials to produce gas on an industrial scale.

Members of the evaluation committee include businessmen, engineers, scientists and specialists in environmental protection, such as Jose Mindlin and Paulo Francini.

Complex Task Ahead for Evaluation Committee

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 16 Jan 86 p 5

[Text] The main lines of the revision of the nuclear program have not yet been defined, but as early as March President Jose Sarney will be receiving the final document from the committee of businessmen, scientists and experts in the nuclear field in charge of evaluating the German-Brazilian program and the parallel program conducted by the National Nuclear Energy Commission with a view to mastering full cycle technology.

Professor Jose Israel Vargas, chairman of the committee, said yesterday in Rio after a meeting at NUCLEBRAS that the work of the committee is quite complex, and that it intends to evaluate everything that has been done up to now in the nuclear field in Brazil, besides determining the role nuclear energy will play in meeting future energy needs, taking into account all the alternatives.

According to Jose Israel Vargas, they will make 30-year projections on the growth of the Brazilian economy, population, technological developments and the environmental impact of various forms of energy. Institutional changes to enterprises in the field, such as NUCLEBRAS and CNEN, will also be examined; but Professor Jose Israel Vargas is absolutely certain of one thing: construction of the Angra 2 and Angra 3 nuclear plants must not suffer any further interruptions.

Program

The committee evaluating the nuclear program met yesterday with the board of directors of NUCLEBRAS to examine technology and commercial contracts between that firm and the Germans. During part of the afternoon, the committee visited the Radiation Protection and Dosimetry Institute and met with the president of the National Nuclear Energy Commission, Professor Rex Nazare Alves.

Today the committee will be in Sao Paulo visiting the Nuclear Energy Research Institute (IPEN) and on Friday it will hold a plenary meeting at the regional office of the Ministry of Mines and Energy. At the end of the month, the committee will visit the Technological Aviation Center and will contact members of PROCON, which is an agency for protection of the nuclear program and includes members of the National Security Council, the Special Secretariat for the Environment (SEMA), the Ministry of the Interior and Civil Defense.

The committee is composed of the following persons: Alberto Pereira de Castro (ENGESA), Professor Caspar Erich Stemmer (Federal University of Santa Catarina), Eduardo Penna Franca (UFRJ), Fernando Claudio Zawislak (UFRS), Jose Ephim Mindlin (Metal Leve), Jose Lameira Bittencourt (IBQN), Jose Israel Vargas (Ministry of Mines and Energy), Jose Leite Lopes (Brazilian Center for Physical Research), Jose Pelucio Ferreira (PUC), Jose Wanderley Coelho Dias, Luiz Augusto de Castro Neves (National Security Council), Luiz Renato Caldas (UFRJ), Marcelo Damy de Souza Santos (PUC-SP), Oscar Sala (USP-SP), Paulo Francini (Coldex), Ramayana Gazzinelli (UFMG) and Roberto Rodrigues Krause (Ministry of Foreign Affairs).

9805/12795
CSO: 5100/2039

BRAZIL

NUCLEAR REEVALUATION COMMITTEE VISITS FACILITIES

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 18 Jan 86 p 5

[Text] The Committee for the Evaluation of the Brazilian Nuclear Program will not announce the results of its work before 19 March, when the 180-day period for it to complete its work has lapsed. "Reporting partial conclusions could generate unnecessary rumors," according to the committee's executive secretary, Jose Mauro Esteves dos Santos.

Jose Mauro said evasively that the committee, which met yesterday at the Sao Paulo office of Furnas, was discussing "at the time" the parallel nuclear program developed with the support of private enterprise. But he later corrected himself: "There are not two programs, one official and the other parallel, but it is all part of a single nuclear policy."

The committee visited the Institute for Nuclear and Energy Research (IPEN) in Sao Paulo, which is already producing uranium hexafluoride gas under the parallel program. "We went to IPEN and everything was explained to us with no secrets," Jose Mauro said, adding that the committee would also make a study of this visit.

He quickly reviewed the work of the committee since it was set up in September of last year: 5 plenary meetings (with 20 members participating--12 persons appointed by various sectors of society, 5 representatives of governmental institutions, and 3 observers from ministries); 5 working groups formed "to examine in detail various aspects of nuclear energy;" 20 technical memoranda; visits to nuclear facilities; and consultations with the community and meetings with leaders and experts from firms involved in the nuclear field.

At the end of its work, the committee is supposed to submit a report to President Jose Sarney proposing aid for a new Brazilian nuclear policy. "Criticism and suggestions from the public which have been sent personally or through documents will be included in the final report." The committee also intends to consult with the Brazilian Association for the Advancement of Science and the Brazilian Physics Association.

Work plans also include meetings with the Institute for Advanced Research of the Technical Aerospace Center in Sao Jose dos Campos, the Nuclear

Engineering Institute in Rio and NUCLEN. According to Jose Mauro, the committee intends to acquaint itself with all Brazilian nuclear facilities.

During these 120 days of work, the committee visited the Pocos de Caldas Industrial Complex, where uranium is produced and refined; the Resende Industrial Complex, which processes part of the manufacture of fuels and where construction of the first cascade of Nuclebras' Isotope Enrichment Plant is in its final stages.

The committee also visited the Angra 1 Plant, the work sites of Angra 2 and 3, the Institute for Energy and Nuclear Research, the Radiation Protection and Dosimetry Institute of the National Nuclear Energy Commission, and Confab Industrial and Nuclebras Heavy Equipment, both involved in manufacturing major components for the plants, as well as the Center for Development of Nuclear Technology in Belo Horizonte, which primarily conducts tests of nuclear components and refines ore from Itataia, in Ceara, on a pilot basis.

Jose Mauro indicated that during the visits, "extensive discussions with experts from each institution were held." The committee met with leaders of the National Nuclear Energy Commission, Nuclebras and its subsidiaries, Electrobras, Furnas Centrais Eletricas and the Sao Paulo Energy Company. "At these meetings, the committee learned of the problems in the nuclear sector from the standpoint of each enterprise."

According to Jose Mauro, the committee is tackling the nuclear issue from three basic standpoints: the role of nuclear energy in domestic demand, the technological aspect ("and its ramifications in the social, industrial and scientific spheres") and environmental aspects. "These combined studies should suggest new options in different areas related to nuclear energy." These would include the creation of a standard for activities in keeping with the domestic reactor industry and the cycle of the fuel. "We may also suggest a technological program compatible with uses which have also suggest a technological program compatible with uses which have an economic impact, in addition to an appropriate manpower program." And even an "operation model" for the nuclear program.

"To get the views of all segments of the community involved in the nuclear question," Jose Mauro said that various entities were consulted, including the Brazilian Association of Basic Industries and the Brazilian Association of Engineering Consultants.

Participating in the committee are university professors, scientists and business executives such as Jose Mindlin and Paulo Francini. Its chairman is Professor Jose Israel Vargas, advisor for nuclear affairs at the Ministry of Mines and Energy.

9805/12951
CSO: 5100/2944

BRAZIL

FUND SHORTAGE AFFECTS NUCLEBRAS PROGRAMS

PY221432 Brasilia Radio da Amazonia Network in Portuguese 0900 GMT 22 Feb 86

[Report by Antonio Carlos]

[Text] Nuclebras [Brazilian Nuclear Corporations, Inc] President (Mecias Ceabral) yesterday stated that the energy supply in the southeastern and south-central regions of the country may be affected in 1992 if Nuclebras programs are not finished within the established schedule because of the shortage of funds. This situation also affects the ANGRA II and ANGRA III nuclear plants, which are included in the Eletrobras [Brazilian Electric Power Companies, Inc] electrical system budget and which are scheduled to be operating by 1992 and 1995, respectively. In addition, programs will be rescheduled and, consequently, more funds will be needed, (Mecias Ceabral) explained. [recorded passage indistinct]

About \$2 billion must be invested to finish building the ANGRA II and ANGRA III Plants. Once in operation, the two nuclear plants will produce 2.6 million kilowatts. A task force that was established this month is presently studying the budget that has been allocated to finish the construction programs within the established deadline. This task force is made up of members of Séplan [Secretariat of Planning], the Finance Ministry, and the Mines and Energy Ministry. The study must be concluded by the end of April.

/8309

CSO: 5100/2046

BRAZIL

URANIUM SHIPMENT SENT TO ANGRA-1 PLANT

PY081818 Sao Paulo O ESTADO DE SAO PAULO in Portuguese 5 Mar 86 p 30

[Text] Rio de Janeiro -- The first uranium shipment to refuel the Angra-1 reactor, estimated at \$40 million, was handed over yesterday by the Brazilian Nuclear Corporation [Nuclebras] to Furnas [Furnas Electric Power Plants, Inc.] The shipment was transported in several trucks protected by vehicles of the military police, the highway patrol, and the fire department. The security on the stretch of highway between Resende and Itaorna beach was unprecedented. This fuel will replace one-third of the uranium already burned in the Angra-1 reactor. It was partially produced in Resende.

In fact, this fuel element, or uranium pellets, were only enclosed at the Nuclebras fuel elements plant. The natural uranium extracted from Poco de Caldas has yet to make the long trip abroad to be enriched, going first to France where it is converted in the Pechiney plants into uranium hexafluoride (UF-6). Then the uranium is sent to Urenco, in England, where it is enriched, and then taken to the FRG to be synthetized and turned into pellets before it arrives in Resende, where it is placed in the zircaloy rods from Argentina.

Although Brazil has invested \$30 million in the fuel factory and \$280 million in the pilot plant for enriched uranium, the country is taking its first steps to absorb and master the technology of the fuel cycle. The investments were postponed due to delays in the nuclear program, and progress during the last 3 years was practically nil. The fuel elements factory has achieved almost nothing since 1983. To keep from being idle, it has begun to manufacture precision components for Boeing and the Brazilian Aeronautics Company (Embraer) for the Tucano and AMX planes.

The pilot plant for the "jet-nozzle" [preceding words in English] uranium enrichment process requires an investment of \$20 million to start the first series of associated condensers with 24 stages. This first series of condensers is one unit for a 400-stage industrial plant. Each stage is composed of a huge compressor, a heat exchanger, and a chamber with the elements for Uranium 235 separation.

Technicians of the Brazilian Nuclear Corporations, Inc (Nuclebras) have reported that even if the technological problems associated with this process are overcome and it can successfully produce enriched uranium at an industrial rate, rather than just a laboratory level, this uranium enrichment plant would still be extremely costly. Its productive unit, called Isotopic Separation Unit [Unidade de Separacao Isotopica -- UTS], will cost \$450 compared to the \$150 [figures as published] Urenco charges Brazil for the same service. The international market for enriched uranium is saturated with

offers, and the United States has announced that it will put its laser-enriched uranium plant into operation this year, charging \$80 per UT\$.

The Nuclebras technicians believe it is absurd that the country has invested \$280 million in constructing the pilot plant and is now considering suspending the plan for lack of \$20 million. They are certain that the process can produce enriched uranium at industrial levels, but they must know if it offers an effective control system, if the series of associated condensers can work at a steady pace, how much energy will be used, the necessary level of redundancy, and how the central systems must be composed, besides obtaining data on the separation of UF-6 through hydrogen.

If the government decides to grant the remaining \$20 million required to carry out the project, which seems to be the most reasonable alternative, the above questions will only be answered in 1988, when the government will receive a report appraising construction of an industrial plant costing DM2 billion, or almost \$1 billion. In any case, the Nuclebras technicians defend continuing construction at the enriched uranium plant. Work at the Resende industrial nuclear complex, meanwhile, is semi-paralyzed.

/6091

CSO: 5100/2047

BRAZIL

BRIEFS

APPOINTMENT TO CNEN--President Jose Sarney yesterday appointed the president of the Votorantin Group, Antonio Ermirio de Moraes, to the Deliberative Committee of the National Nuclear Energy Commission (CNEN). The CNEN is the regulatory agency for the national nuclear sector and is also involved in technological training and development for the country in this area, reviewing and paying royalties to domestic private companies involved in all aspects from manufacturing radioisotopes to nuclear medicine and sterilization equipment. [Text] [Sao Paulo O ESTADO DE SAO PAULO in Portuguese 22 Jan 86 p 28] 9805/12795

CSO: 5100/2039

CHILE

NUCLEAR EXPERT CRITICIZES GOVERNMENT POLICY

PY142243 Santiago EL MERCURIO in Spanish 10 Feb 86 p C 3

[Excerpts] "If Chile had an adequate policy in the nuclear energy field, it could develop an adequate infrastructure to meet the domestic energy consumption demands. The necessary manpower could be trained in a short time, a task that is currently being fully undertaken by the University of Chile." This statement was made by Carlos Infante upon the conclusion of a course called: "Nuclear Physics: Basic Research and Applications." Infante is an academician at the University of Chile, Faculty of Science.

Infante said that "Chile possesses the La Reina nuclear reactor. It would be very useful to maintain it. Presently, only 10 percent of its capacity is being used because it is felt that this is sufficient. In this regard, an adequate policy is lacking in our country." Dr Infante added that "in 1984, the average energy consumption in Chile reached 1,500 megawatts and with two large reactors (because this is the only way to lower the costs) these needs will reportedly be met. The energy consumption increase during certain hours in winter justifies the installation of a nuclear reactor. This is something that will be reviewed in 1990."

The review of this problem is justified by the high cost incurred in meeting energy demands which "are currently met by operating the Renca and Quintero thermoelectrical power plants. However, these plants produce energy at a very high cost because they are mainly operating on petroleum. This could increase the need for a reactor," Infante said. The reactor in the La Reina Research Center is currently being used for industrial and medical purposes, making it a leading center in these fields in Latin America.

/9738
CSO: 5100/2045

BANGLADESH

IMPORTANCE OF NUCLEAR ENERGY TO BANGLADESH DEVELOPMENT

Dhaka THE BANGLADESH OBSERVER in English 2 Feb 86 p 5

[Editorial]

The sources of energy are numerous. Some countries depend on fossils like coal and oil. Others use solar, water, gas, biogas and wind sources. Yet others are found using the fission and fusion process for getting energy. Nuclear energy is quite competitive in terms of cost and efficiency. It may also keep the environment clean if waste is buried properly as in developed countries. In a way nuclear energy is better than oil and coal, because the scope of environmental pollution is relatively wider in the latter cases. While fossil sources are not unlimited, renewable sources of energy like wood, for example, are also difficult to get. Whatever be the sources, Bangladesh badly needs to increase the availability of energy, if a breakthrough is to be achieved in development.

Experts say that developing countries need more of energy than the developed ones. This is so because of the fact that the latter have attained better efficiency in the use of energy. That being so, more and more energy is needed if more and more units of production and larger operations are to be ensured by motive power. A change-over from manual to motive power is an essential condition for growth and development. If all the boats were to be propelled by engine, for example, in preference to currently used boatmanship, the results in terms of river transport will be tremendous. So will be the case with the manually pedalled rickshaws. In the field of agriculture and industry a revolution could be expected to happen once we have larger and cheaper supply of energy. It is imperative therefore for the policy-makers to look for the alternative sources of power.

Nuclear energy is needed more by countries like Bangladesh where alternate natural sources are extremely limited. This is why the Atomic Energy Commission was set up in the sixties and it was expected that it would explore other sources of

energy and provide skill and know-how for the Ruppur Nuclear Plant. It may be pointed out that the AEC has done some good work in the area of crop development and crop-protection through nuclear research, but its contribution to development of nuclear energy is as good as nil. As for the Ruppur Nuclear Plant it has become more a liability than an asset, as periodical reports suggest. Obtaining energy from nuclear sources therefore remains still a far cry in spite of all the sunk cost.

Those in authority should take lessons from developed countries and adopt policy of exploitation of nuclear energy side by side with exploiting the conventional sources. When countries like France Sweden and the USA use nuclear energy as an alternate source despite their having huge known reserves of coal, oil and gas, Bangladesh should not depend either on its known gas reserves or the imported coal and oil. Experts indicate that with the abundance of silicon and sun-shine Bangladesh could explore the possibility of using them for the generation of chemical and solar energy. The solar cooker is clearly a substitute for domestic gas and electric connections. Likewise nuclear energy could work as the pivotal source of power in addition to gas, hydro-electric and thermal power. With the demand for energy increasing it is time that Bangladesh went for nuclear energy in a big way.

Obviously nuclear energy is a high-technology proposition. The Atomic Energy Commission should have by now trained up the personnel needed for installation and operation of nuclear plants. Quite a substantial amount of resources has been spent on training our nuclear physicists and technologists. They need to be put to work, by obtaining and installing necessary equipment. The wastage involved in keeping the trained manpower idle would be far larger than the projected cost of installation. The conventional sources of energy being limited the opportunity cost of installation for nuclear plants would be favourable. For this a thorough review of the energy sector is called for.

The task should therefore be entrusted to duly qualified and dispassionate experts. The work initiated in the sixties should be taken to its logical end with a view to utilizing the nuclear energy as an alternate source of tremendous possibilities. The need is felt in all well-meaning quarters including the UN, whose Adviser on Energy suggested to a select gathering in Dhaka in May last year that with appropriate and environmentally benign technology various sources including nuclear fission and fusion should be brought into use for meeting the upcoming demands for energy in this country.

BANGLADESH

BRIEFS

BAEC TWIN PROGRAMS--The Chairman of Bangladesh Atomic Energy Commission (BAEC) Dr Anwar Hossain said in Dhaka on Friday that the Commission was now engaged in the twin programme of application of radio-isotopes and radiation sources in agriculture medicines food preservation hydrology and industry and introduction of nuclear power in the country reports BSS. He was speaking at the inaugural function of a 3-day seminar on "Industrial Traces Application" which began at the auditorium of BAEC according to a press release. About 30 participants from 15 organisations of the country are taking part in the seminar organised jointly by International Atomic Energy Agency United Nations Development Programme and BAEC. [Text] [Dhaka THE BANGLADESH TIMES in English 2 Feb 86 p 3] /13104

GIFT FROM IAEA, USSR--Bangladesh Atomic Energy Commission will install a food irradiator in Chittagong with the cooperation from Beximco Bangladesh Ltd. The one million dollar irradiator has been offered by the International Atomic Energy Agency (IAEA) under its technical assistance programme. The irradiator will be supplied by M/S Techsnabepoort of USSR, according to a Press release of Bangladesh Atomic Energy Commission. [Text] [Dhaka THE BANGLADESH OBSERVER in English 31 Jan 86 p 10] /13104

CSO: 5150/0070

EGYPT

AL-DAB'AH PLANT DELAYED

London MIDDLE EAST ECONOMIC DIGEST 8 Feb 86 pp 11, 12

[Text] The government has decided to press ahead with the nuclear power programme, it is understood. But it is as yet unclear what is to be done about specific plans to build the first power station at Al-Dabah, west of Alexandria.

The three contenders for the contract in late 1985 were invited to extend the validity of their offers to 25 February — bids were originally submitted in November 1983. Industry observers say it will be hard for the bidders to renew their financing offers if the client requests another extension (MEED 26: 10:85).

The three groups bidding are West Germany's *Kraftwerk Union (KWU)*, the US' *Westinghouse Electric Corporation* and a Franco-Italian consortium led by France's *Framatome*. KWU and Westinghouse are offering to build a single 1,000-MW unit; Framatome has proposed a twin-unit plant, with total capacity of 2,000 MW. The cost is estimated at about \$ 1,100 million-1,300 million for each unit.

Pledges for financing and export credit cover have been obtained for 85 per cent of the foreign currency portion of the various offers. The French and Italian governments have agreed to back Framatome's bid; KWU's financing

involves West Germany and several other European countries; Westinghouse, heading a multinational consortium, has arranged finance from the US, Japan, Spain, Belgium and the UK.

Cairo observers say they expect the *Nuclear Power Plants Authority* to award one, two or even three letters of intent by 25 February. This would be followed by lengthy discussions with the bidders — possibly lasting two or three years.

The desirability of going ahead with the Al-Dabah station has been questioned in government circles in recent months. There are doubts as to whether Egypt can afford to proceed with such an expensive scheme in the present depressed economic climate. Critics note that the fall in oil prices has lowered the cost of conventional power generation. And the Egyptian Electricity Authority has drawn up plans to install more than 2,000 MW of coal-fired capacity by the early 1990s (see below).

In the light of these factors, the reported decision to go on with the nuclear programme is seen by industry observers as a decision not to cancel Al-Dabah just yet, rather than as a firm sign that the project will go ahead.

/12851

CSO: 5100/4606

PAKISTAN

BRIEFS

U.S. AMBASSADOR CITED ON NPT--The U.S. ambassador to Pakistan, Mr Dean Hinton, has asked Islamabad to sign the nuclear nonproliferation treaty. In an interview with the Pakistan paper JANG, Mr Hinton expressed doubts about Pakistan's atomic program. He said if Pakistan wants to pursue its nuclear program for peaceful purposes, it can get more aid from the United States and other countries. [Text] [Delhi Domestic Service in English 0830 GMT 2 Mar 86 BK] /6662

CSO: 5100/4137

SOUTH AFRICA

POISON FEARS DELAY WORK ON POWER STATION

Cape Town WEEKEND ARGUS in English 8 Feb 86 p 7

[Article by Tom Hood]

[Text]

FEARS about possible asbestos poisoning are delaying arrangements to demolish Cape Town's Table Bay Power Station.

Tenders for the demolition of the old power station were recalled and stringent requirements inserted for the removal of highly toxic asbestos.

The new tenders were re-issued this week, with a closing date of March 6, the city's electrical engineer, Mr D C Palser, said.

Power stations contains large amounts of blue asbestos used in lagging pipes for insulation and covering beams for fire protection and Escom has been investigating ways of removing asbestos, dust from which could cause a fatal lung disease.

Strong wind

Health experts fear a strong wind on the city's Foreshore could spread deadly asbestos dust over the central city unless there is strict control during removal of plant from the power station.

Mr Palser said the tenders were reconsidered in the light of new legislation proposed for the handling of asbestos.

"We have made more inquiries overseas and after discussion with the medical officer, Dr Reg Coogan, it was felt we should tighten up the specification, placing particular emphasis on this potential health hazard and the careful removal of asbestos when plant is dismantled."

Health authorities have pressed for tighter control over handling asbestos. Draft legislation was published in October and the Department of Manpower wants to get this promulgated this year.

Heavy fines

Partly based on American experience, it will lay down heavy fines where employers do not provide adequate breathing masks, protective clothing that is burned immediately after use and machines to suck up dust.

Asbestos waste, coming in increasing quantities from recycled and demolished buildings, will also have to be stored in deep holes in the ground and treated as carefully as radioactive waste from nuclear power stations.

There is a world-wide campaign against the often-fatal asbestososis, caused by inhaling asbestos dust.

As in other countries, owners of a large number of South African factories and other buildings could be forced by legislation in the next 10 years to de-gut their buildings of friable asbestos.

Part of the Voortrekker Monument in Pretoria is already closed to the public while workmen remove defective plaster containing asbestos fibres.

A large office block in Bellville was recently degutted of asbestos plaster and each room had to be sealed off.

However, some health authorities are worried that pressure to force property owners to remove ageing friable asbestos could lead to backyard operators entering the field -- "the familiar team including unskilled labourers with a sledgehammer and wheelbarrow."

A Cape expert on handling asbestos, Mr John Barratt, managing director of Macamm W P, part of the Fred Whitehead group, said: "If amateurs become involved in this work they will eventually contaminate their workforce and possibly other people working or living near the site and even cause their deaths through asbestosis, mesothelioma or lung cancer."

↗ **Mr Barratt said the danger is that inexperienced operators could be awarded contracts because they were able to undercut the professional operators by not observing all the necessary precautions.**

Lung diseases caused by particles of friable asbestos in the air often took 15 to 30 years to become apparent. An unprofessional contractor therefore could get away with malapactices for a considerable time unless he was monitored.

● **Building contractors are to be given advice about safe ways of removing old asbestos on March 20 at a seminar in Cape Town. Speakers include the president of the largest asbestos stripping company in the United States and South African medical and industrial executives with experience of asbestos.**

/12828
CSO: 5100/16

USSR

DISCUSSION OF SOVIET NUCLEAR POWER AID TO CUBA

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 31 Dec 85 p3

[Article by N. Lukina, senior instructor for Sverdlovsk City Institute Foreign Language Department, Havana-Sverdlovsk: "Cuba's Atoms of Peace," passage in ALL CAPS printed in boldface]

[Text] TOMORROW THE CUBAN PEOPLE NOTE THEIR NATIONAL HOLIDAY--LIBERATION DAY

The first thing you notice when approaching the construction site for the "Juragua" nuclear power station is three large tents. They stand along the road at the edge of a large field sown with stiff jute "cacti." On each tent were some of these words:

"Soviet and Bulgarian friends
Are helping Juragua Granma
Meet its 1 January goal!
Fidel Castro!"

More than a quarter of a century has passed since the yacht "Granma" landed the revolutionary assault on the eastern end of the island. It was a small spark from which the flame of the liberation struggle blazed up in the Sierra Maestra Mountains and then went down from the mountains to the capital. The history of free Cuba began on 1 January 1959. The Cubans have linked the construction of the nuclear power plant on the Island of Freedom with the name of the legendary yacht.

In order to defend and strengthen its independence, the titanic efforts of the Cuban people and support of its friend have been required. Among all the types of aid which have been given by friendly countries to the Island of Freedom, the deliveries of crude and fuel oil have been of special significance. Cuba is poor in energy sources and there are no deep or fast moving rivers. No large reserves of oil have yet been found, and the energy in the ebb and flow of sea tides is insignificant.

It is for this reason that 17 April 1960, the day a Soviet tanker with oil arrived in Cuba, can be considered the beginning of a historic era in the nation's energy. Since that time deliveries of Soviet oil have grown every year. Our country has given Cuba a great deal of aid in locating reserves of

mineral fuel and training cadres of geophysicists and geologists. Until now electrical power stations using imported fuel were built with the technical cooperation of the Soviet Union and are now in use. Saving fuel imported from overseas was a large and acute problem for Cuba. "All types of Cuban industry require electricity and the requirement is becoming greater and greater. It is specifically for this reason that today it is all the more necessary for us to conserve electricity," said the head of the Cuban government, F. Castro.

Building nuclear power plants is the way by which it will be possible for the country to solve its energy problems. Speaking at a forum on Cuban power, Fidel Castro presented the expressive figures showing the economic factors in constructing a nuclear power plant: If 40 tankers with a capacity of 25,000 tons are required to import 1 million tons of oil, then to transport 2.5 million tons (the amount of fuel that will be saved by a nuclear power plant in 1 year) would require 100 tanker trips.

...On the desert shore the steel and concrete structure rose. Tall cranes lift the parts for assembly. On the construction site where equipment is being operated, one can hear Russian and Cuban Spanish. This is the way the construction of the first nuclear power plant in Cuba, the third in Latin America, is today. Soviet and Cuban specialists came to this quiet land in November 1981. The chief of drilling and blasting, B. Grigorchuk, arrived with the first load. He remembers very well 18 January 1982 when the first peaceful explosion raising a cloud of red dust rumbled here. Then they began to excavate the foundation area and lay the first cubic meter of concrete for the reactor building foundation.

"It was hard," said B. Grigorchuk. "A tropical climate and an unfamiliar Spanish language made the work more difficult. But now much of this is behind us."

Many difficulties fell to the Soviet specialists V. Balay and B. Kotenko. During the removal of the first geodesic areas, it was necessary for them to contend...with impenetrable growths of clinging and vicious bushes, the name of which in Spanish sounds kind enough--"Murava." Training the Cuban "counterparts" (working partners) was not easy. Those with whom it was necessary to start from the very beginning are now independently solving complicated topographic problems and skillfully using the tools provided by the Soviet Union and other countries. A majority of the Cubans who have construction specialties are prepared to become power station employees and work at the nuclear power plant here in the future.

Among the Cuban specialists there are many who have been trained in our country. In our first days of work at the construction site, I attempted to translate the advice of our specialists for the Cuban foreman, J. Nestor. The foreman laughed and in almost perfect Russian said that he did not need my help: He had studied and done an internship in the Soviet Union and had learned our language very well.

Many good traditions of the Soviet people have become well adapted at the construction project. It was necessary for us, the Soviet specialists, to participate in an international subbotnik. Together with the Cubans we picked

yucca, oranges, tangerines and lemons. The subbotnik was converted into a holiday of labor and international friendship. The work was done with inspiration while singing and telling jokes.

The Soviet specialists and the Cuban builders completed an agreement for an international competition, the results of which are posted here regularly. In this agreement there are points on the joint search for more economic methods of construction, the preparation and study by Cuban specialists of leading examples and the best experience in building nuclear power plants and for savings by realizing technical recommendations.

No small experience has been gained here. New specialists building the Beloyarsk, Voronezh, Zaporozh, Kursk and other nuclear power plants in the USSR visit the construction project because of the construction and assembly. In 1984, the Bulgarian Specialist Brigade imeni F. Castro arrived. In it were 82 people, the same as were on the yacht "Granma" who lit the revolutionary fire in Cuba. The Bulgarian builders built houses, dormitories, stores and other nuclear city facilities. Ahead are a sea of things to do, but at the "Granma Juragua" there is a reliable team and no one doubts that the nuclear power plant will meet its 1 January goal.

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USSR

BRIEFS

CEMA NUCLEAR INSTRUMENT COLLECTIVE--Instruments using peaceful atomic energy may be found in research laboratories where people are penetrating the secrets of matter and in the shops of large factories, in Antarctica and in space, among the equipment of geological search parties and in a doctor's office. Scores of "intelligent," high quality instruments and devices responding to the peaceful scientific-technical level are now being displayed in the "Expocenter" halls which are in the Moscow Sokolniki. Here, there is a special display of the international economic association for nuclear instrument building--"Interatominstrument." This organization with its center in Warsaw was created in 1972 in order to fully satisfy the growing demand by the socialist countries for peaceful atomic equipment and strengthen integration. Now it operates under the principle of cost accounting and already several years ago went to full self-repayment. The members of the association are 16 enterprises and international trade firms from the PRB [People's Republic of Bulgaria], HPR [Hungarian People's Republic], GDR, PPR [Polish People's Republic], USSR and CSSR which provide for export and import of nuclear equipment. "The atom is for peace: that is the main idea of our work," said Miroslav German, the association director. An important part of the activity of "Interatominstrument" is service. It is made of branches located in the cities of Pleven (PRB), Dubna (USSR) and Zelena-Gura (PPR). Here is where they conduct warranty and other services on equipment and design, assemble and produce instruments. [By L. Chausov] [Excerpts] [Moscow PRAVDA in Russian 17 Oct 85 p 5] 12747

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SPAIN

CONSTRUCTION OF TRILLO, VANELLOS NUCLEAR PLANTS CONTINUES

Madrid LUZ & FUERZA in Spanish Jul-Aug 85 pp 5-11

[Text] In early July, upon his return from the AIE [International Energy Agency] meeting in Paris, Martin Gallego, Spain's secretary of energy, made some statements which were then disseminated by the media.

He was quoted literally by the press on 11 July, to the effect that "the PEN [National Energy Plan] still has too much oil in it," and that our nation "must use these bonanza years to catch up its accumulated backlog in relation to the energy situation of the EEC countries and of the rest of the AIE members."

That opinion--exactly what we have been saying in all of our repeated and perhaps overly repetitious commentaries in LUZ & FUERZA on the new National Energy Plan--has over our personal view the dual advantage of coming from a very high level official in Spain's energy field, and secondly, for that very reason, we assume that it is backed up by very up to date and accurate figures and statistics, and not by the more or less obsolete data provided with delays and many corrections that are so often found in government publications.

Such a singular agreement in our views would certainly seem bound to please us, as we suspect it will so many thousands of interested onlookers and participants in the energy sector, who for years have had their doubts about the wisdom of hydrocarbons as a source of energy production, in comparison with other technologies. This really isn't a very abstruse conclusion. We need only a good budget summary of our foreign balance of payments, plus a simplified analysis of the kw/hour costs entailed in the various methods of producing energy.

And let us say that this statement does please us, for it shows that our officials and authorities have finally managed to cut through the Gordian knot and have seen the truth. Which is, that while the wealthier members of the EEC are all together reducing their dependence on oil to about 54 percent--and we don't even want to mention some, like France, which is on the verge of winning the battle--for Spain, oil still provides 69 percent of our final energy supply.

The secretary of energy, we learned from the news reports, gave the future keys for a solution, based substantially on the following principles: "to stimulate the development of our own resources and heighten the tax advantages for the use of water resources." That seems great to us, though we doubt its efficacy, given the shortage of such resources in our subsoil and the saturation of our water potential on the surface. Another key: "the development of our own natural gas fields." (We prudently inserted the adjectives "our own" here, since without that clarification, the reader might interpret this to mean "foreign" gas fields, because of the magnitude of our scheduled purchases from Algeria). And in the end, "the development of coal mining with an eye toward profits." This still doesn't mention that phrase, though, so it avoids irritating some of our regular South African and far distant Australian suppliers. This "eye toward profits" is an idea that, in our opinion, is much easier to say than to put into practice. Let them tell that to the mining companies, which are today bogged down in the most critical and conflict-ridden sector of our nation, which are overburdened with a thousand reconversion projects, measures promoting economic health, and recovery programs--all of them apparently useless, if we are to judge by the limited fruits they produce,

In his remarks, Martin Gallego said nothing about the atom as an outstanding weapon in the war against energy dependence on foreign sources. There was not the slightest allusion, we learned from reading the papers which reported his statement, to a topic that appears to arouse great misgivings in our leaders, and to which they systematically avoid the slightest reference. This is surprising in an obviously well informed official, particularly as he had just returned, not from Lusaka, but from Paris: the capital of the world's second greatest power in nuclear electricity production.

Finally, we who do believe in the atom, who have confidence in its safety, and understand the vital role it must play in our energy future, will devote the following paragraphs to a short synopsis of the two--and it now seems the last--of our nuclear power plants for the near future, with their powerful atomic hearts which will pump blood to the arteries of industrialized Spain.

Trillo I

Trillo I is located in Guadalajara province in an area known as "Cerrillo Alto" belonging to the municipality of Trillo in the Alcarria region. This is a "third generation" plant (unlike the Cofrentes plant which, along with Almaraz, Asco, and Lemoniz, make up the history of nuclear power plants in Spain). Its reactor has highly advanced features, as does the design of the entire plant, which uses European technology (similar to Germany's Neckar Westheim plant, which has been in operation since 1976). The plant's major pieces of equipment--the pressure container, steam generators, pipes, pressurizer, etc.--were made by Spanish industries.

Like the Cofrentes plant and the second Almaraz, Asco, and Vandellós units, its completion and start of service were authorized under the new Energy Plan, a fate that was not shared by many other plants, which were cancelled or whose construction was paralyzed under this program (Lemoniz I and II, Valdecaballeros I and II, and Trillo's Unit II), to the dismay of our long-suffering heavy equipment sector and to many of the companies that own them.

After careful preliminary studies, factors of a technical, economic, geologic-geographic, and human nature were all considered in determining the site of this plant, while weighing the suitability of such a huge and vital investment.

Its proximity to large populated areas and expanding industrial regions (Madrid, Guadalajara, Alcalá de Henares) with a great potential for consumption, the economically disadvantaged nature of this area and the need to provide job incentives that will enable its natives to return (for many years, and in increasing numbers the local people have migrated to other more fortunate areas to find jobs), the plentiful water supply provided by the Tagus River and other rivers in the area, and finally, the solidity of the terrain chosen in an area almost free from any seismic dangers, all combined to decisively settle the selection of this plant's site.

We won't dwell here on the plant's technical features, which have been amply described in other articles appearing in this publication, nor on the extensive investments devoted to safety (approximately a third of its cost), with redundant and independent systems with up to four automatic redundancies in the areas requiring maximum attention. In reference to the latter point, we will only mention that all of the plant's components comply with the requisite international standards, and have been approved by the IAEA [International Atomic Energy Agency], an agency of the United Nations.

Some Chronological Stages in Construction

December 1984. Construction of the plant's ventilation stack continued. This is a reinforced concrete structure with a circular section, and with its superstructure in the form of a truncated cone. When the stack is completed, it will have three different parts: the lowest part, consisting of the foundation slab and the first segment of the truncated cone, and the two upper parts, two superimposed truncated cones. Its total height will be 100 meters. Its fundamental purpose is to provide ventilation for the plant's various buildings. Its completion is scheduled for April of this year. In this structure, 150 tons of reinforcement, 1,700 m³ of concrete, and 3,300 m² of forms were used.

In December 1984 the assembly of the plates, bases, and housings for the bearings that will provide support for the axis of the plant's turbine-alternator began. These components rest on a bed or pedestal of reinforced concrete, which in its turn is supported on 91 elastic structures composed of springs.

January 1985. The third and last of the steam generators arrived at Trillo I during this month. The steam generators will be housed in the plant's reactor building. At the same time, work progressed on the control room, positioning and leveling the framing for the various panels needed in this room.

February 1985. Construction of the diesel building is nearing completion; 1,300 metric tons of reinforcement, 7,300 m³ of concrete, and 10,800 m² of framing were used for this building.

At the same time, the electronic panels were being installed in the computer room, located in the plant's electrical building.

March 1985. Work on the roof of the turbine building is nearing completion. In addition, the final touches are being put on the vertical walls of this building. The area under cover is 3,860 m², while the area of the vertical facades will be 8,861 m².

April 1985. The supports for the condensation system, which has 44 casings composed of two springs each, located under the shafts of the condensation system, are being readied for final installation and positioning. The pipe-work is also nearing completion. This consists of installing over 62,000 titanium alloy pipes for this condensation system. At the same time, the electrical power line that will connect Trillo I with the Loeches substation has been authorized.

May 1985. Concrete work for the hemisphere that will cover the reactor building's metal sphere is beginning. This structure will use 10,700 m² of framing, 4,300 m³ of concrete, and 830 tons of reinforcement.

June 1985. The three rotors for the plant's low pressure chambers are being installed. These turbine revolution devices are 9 meters long and 3 meters in diameter. Each of them weighs 86 tons.

July-August 1985. The installation of the pipes making up the plant's primary circuit is now being completed. The total number of manhours required was 26,000, although we should note that this work, which took 5 months for the assembly and welding of this complex system of pipes, was extraordinarily short, when compared with the normal amount of time required for the construction of similar plants.

At the same time, a number of tests were conducted of the demineralization building, as well as of the instrumentation and control panels and local command posts for this building.

Present Status of the Project (as of 31 August 1985)

1. Civil engineering; 95 percent of the concrete work scheduled has been completed. Finishing touches will be added as needed, after the equipment has been installed.

2. Primary system: installed.
3. Heavy equipment: installed.
4. Pipework: Over 50 percent of the pipes have been installed.
5. Ventilation: Over 80 percent has been done, and finishing work is being done in the main areas.
6. Electrical installation: Over 60 percent of the total length of the wiring has been installed.
7. Secondary system condenser and turbine: in an advanced stage of installation.
8. Substations: Principal (400 KV) in final installation phase. Its completion is expected during this quarter. Support substation: completed and voltage on.
9. Condenser cooling circuit or tertiary circuit; Civil engineering work (cooling towers) has been completed, and the rest of the components (pumps, etc.) are in an advanced phase of installation.
10. Demineralization plant: Now in production. Motor control booths: ready, but still awaiting final testing.
11. Control room: in advanced installation stage. Computers; The basic computer is almost operational now (scheduled to be ready by 7 October).
12. Primary circuit's emergency cooling system (two pools and two sets of concrete towers using a forced draft system): Completed, and pools have been tested.

Hydraulic testing of primary circuit; This is expected to be done during the first 4 months of 1986.

Fuel loading: scheduled for the end of next year [1986].

Vandellos II

The Vandellos II nuclear power plant is located on the Mediterranean coast approximately 40 kilometers south of Tarragona between highway A-7 and the sea, in the Lleria Gulch in the Malaset area. The closest town is the city of Hospitalet del Infante, about 6,5 kilometers northeast of the plant's site.

This plant will complete the nuclear electricity production system of the Catalan Autonomous Department, which in its initial phase handled the Vandellós I and Asco I nuclear power plants (first and second generation plants, respectively). When they began operation, they were able to provide coverage for a large electricity demand throughout the entire region.

Chronologically, this plant is one of the third generation group, that is, one of the last in the major nuclear program undertaken in the 1960s and beginning of the 1970s. Consequently, it incorporates the latest and most advanced technology.

The up-to-date features of its design have been recognized internationally. With its new and carefully designed special features, it has served as a reference plant for a number of bids conducted abroad.

The facility will be equipped with a light pressurized water nuclear boiler with a nominal power of 2,785 MW of thermal energy, powering a turbo-alternator with a gross power of 982 MWe. It will have three cooling circuits, slightly enriched uranium dioxide fuel, plus the requisite auxiliary systems and technological safeguards.

The plant's annual estimated production of electricity will be about 5.5 billion kW/h. One month a year is scheduled for shutdown for refuelling.

Its construction permit was issued by the ministry of industry and energy on 29 December 1980. Its public utility statement was issued on 9 May 1981, and it has received the appropriate licenses from the Vandellós municipal council.

Over 4,000 people have worked on the plant's construction. They were needed to move approximately 1,300,000 m³ of rocks and earth, to pour about 190,000 m³ of concrete reinforced with approximately 27,000 tons of steel for framework structures, and to install roughly 70 kilometers of pipes and 2,200 kilometers of electrical wiring.

Over 80 percent of the work for the plant's construction is being done by Spanish industries.

Current Status of the Project

Percentage Completed

Pipes	97
Mechanical equipment	94
Electrical equipment	77
Total equipment	90

Construction

By the end of August 1985, it was calculated that 75 percent of the construction had been completed.

Civil Engineering

At the start of the project, 320,000 m³ of concrete were poured for buildings and external areas. Of this, 192,000 m³ was structural concrete and the rest was low-grade concrete used for fill.

Various Stages of Completion

EAH [Framing, Reinforcement, and Concrete Work]

The stage of completion of this work, by building, is as follows:

	Percentage of completion
Containment building	99
Auxiliary building	100
Access building to the auxiliary building	100
Control building	100
Penetrations building	100
Cat-Diesel building	100
Components building	100
Fuel building	100
Turbine building	100
Equipment preparation building	100
Circulation water	85
External areas	90
Wastes building	92

The overall status of the EAH is 95 percent complete.

Surface coverings for all the buildings.

Lining for the containment building: 100 percent complete.

Fuel storage pool: 100 percent.

Refuelling cavity and transfer channel: 100 percent complete.

Status of all civil engineering work:

The total status of the civil engineering work is 90 percent complete; this includes the EAH, surface coverings, metal structures, and architecture.

The concrete dome of the reactor building has been finished; it now needs only its prestressed concrete work, which is in the process of completion at the present time.

Mechanical assemblies for the nuclear part of the plant:

	Percentage of completion
Large pipework	72
Small pipes	55
NSSS [Nuclear Steam Safety System]	65
Rest of equipment	91

Origin status is 69 percent complete.

Mechanical assemblies for the conventional part of the plant:

	Percentage of completion
Condenser	96
Large pipework	67
Small pipes	48
Generator pipes	47
Rest of equipment	76

Total origin status is 65 percent complete.

Electrical systems:

	Percentage of completion
Trays	94
Ducts	44
Installation of wiring	23
Connections	1
Electrical equipment	56
Lighting and miscellaneous	23
Grounding system	20
Safety plan	0

Origin status is 44 percent complete.

Conditioning and other systems:

Ducts	54
Equipment	74
Fire protection systems	1
Origin status is	49 percent complete.

Instrument installation:

Preparation for this installation was made in March, to be started in April; 1 percent had been completed by September.

Total status of installation work;

Percentage of completion

Mechanical installations for the nuclear part of the plant	69
Mechanical installations for the conventional part of the plant	65
Electrical installations	44
Air conditioning installation	49
Instruments installation	1

Total origin status is 55 percent complete.

For the region, the construction of this nuclear power plant has provided the requisite continuity in investments and a high level of development for the people of the Tarragona area. The economic benefits for the inhabitants of the entire region created by the ongoing investments in a variety of projects, and in general, all of this construction activity, have culminated with the construction of the plant. This has provided a source of work for local equipment manufacturers; it has drawn resources to the area, and has provided a source of economic wellbeing for the region's people.

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